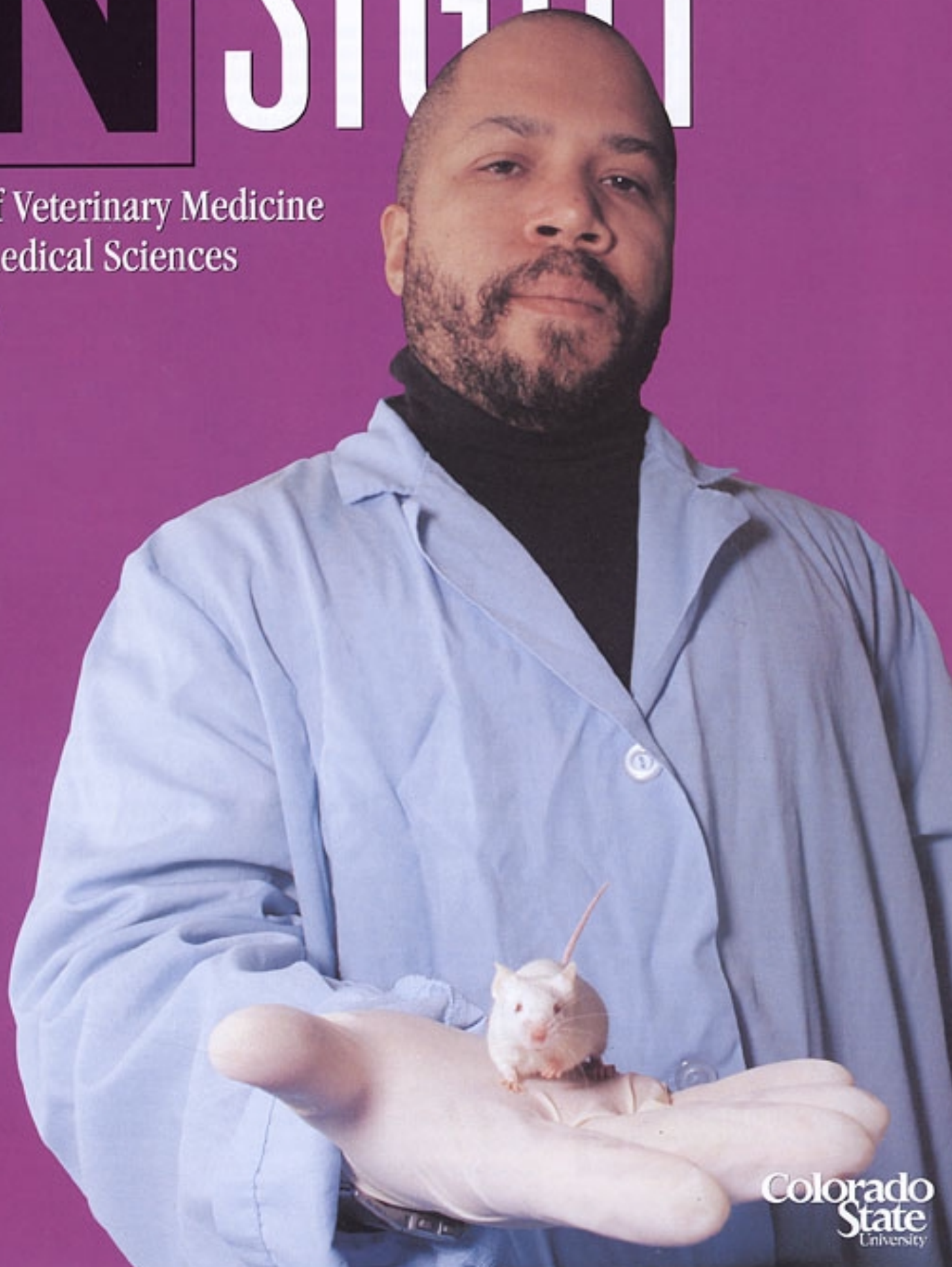


INSIGHT

College of Veterinary Medicine
and Biomedical Sciences

Spring 2000



Colorado
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University

INSIGHT

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On the cover: This Balb/c genetic knock-out mouse, held by Eric Rush, a research associate with the Department of Microbiology, is one of the mice used to study the effects of aging on tuberculosis immunity. Mice like this one are critical to tuberculosis studies that may one day lead to improved vaccines, better treatments, and a clearer understanding of the mycobacteria that cause so much human suffering and death.

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Welcome

Welcome to the Spring 2000 edition of *Insight*, the first edition of the new millennium or one of the last editions of the old millennium, depending on your perspective. But we won't get into that barrel of monkeys here! In this issue, you'll find exciting stories about people, research, and programs at the College of Veterinary Medicine and Biomedical Sciences. You'll also find the *Report on Private Giving*, starting on page 19. The report is our opportunity to thank and recognize friends and alumni who have contributed to the College over the past year.

This edition of *Insight* features a series of articles on the Mycobacterium Research Laboratories based in the Department of Microbiology. This exciting research center is leading the way in the search for vaccines and treatments for the deadly disease tuberculosis. You'll also meet a new faculty member in the Department of Environmental Health who is conducting groundbreaking research into toxic chemicals and their effects on genes. You'll go back to school when you read about the College's K-12 Science Motivation program and go down on the ranch with the Western Center for Integrated Resource Management.

We welcome your questions and comments on both *Insight* and its contents, and the *Report on Private Giving*. If you'd like to get in touch with us, please send your correspondence to:

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You can e-mail *Insight* comments to Paul Maffey, director of development for the College at: pmaffey@cvmb.colostate.edu. We also invite you to visit us at our Web site at: www.cvmb.colostate.edu. ■

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Message from the Dean

Dear Friends,

These days, it seems there's hardly any time for reflection. That's certainly true of us here at the College of Veterinary Medicine and Biomedical Sciences. Life moves forward so quickly, sometimes I feel like one of those harried insects that only has 24 hours to accomplish its life's work. I can hardly believe it when another year has come and gone.

It seems that for much of last year, we were focused on anticipated problems. Thank goodness we survived the changeover from 1999 to 2000 with our sanity and humor intact. I think we all breathed a collective sigh of relief when the New Year proved to be relatively uneventful except for joyous celebrations the world over. What a pleasure now to reflect on the year past and focus on the year ahead with all its possibilities.

In this edition of *Insight*, you'll find the *Report on Private Giving* – our end-of-the-year thank you to all who have supported the College in 1999. It was, indeed, a good year. Private giving to the College was at its highest level ever. The generosity and support of our friends and alumni is something we deeply appreciate.

Planning for one major project is underway. Thanks to your generous donations, the addition at the Veterinary Teaching Hospital designed to house the Animal Cancer Center and Argus Center for Human-Animal Bond Resources is becoming a reality. The Animal Cancer Center must expand so it can continue to help the thousands of pets with cancer. We have received numerous large donations and grants including a \$1 million grant from the National Center for Research Resources of the National Institutes of

Health. Private donors include Hadley Stuart, Robert and Mary Flint, and June Harper, all longtime supporters of the College, and Scott Reiman and family. In May, we will launch the national Paws for a Cause campaign (see story on page 14), to help in the expansion of the Animal Cancer Center and the Argus Center for



Dr. James L. Voss and Dude

Human-Animal Bond Resources. Our special thanks go to Doug and Lynne Seus who are generously allowing their companion, Bart the Bear™, to be the campaign's "spokesbear." Bart is an international celebrity who has starred in numerous movies and television shows and will help get the message out that pets get cancer too.

This year we also saw a \$1 million pledge from Kenneth and Virginia Atkinson to complete exterior work at the Equine Teaching and Research Center. Contributions to the Miki Society are up, as well as scholarship donations. In 1999, we saw the completion of the Biosafety Level 3 building at the Foothills Research

Campus, which will enable us to continue groundbreaking work in bacterial and arthropod-borne infectious diseases. The building should be ready for occupancy by April 2000, once all systems testing is complete.

Internally, the College is in the middle of a reorganization, which will dramatically change the appearance and functioning of departments and programs. This change also is reflected in changes in the Professional Veterinary Medical (PVM) program. The College is taking these steps to meet the needs of its students and to better prepare them for life after graduation. A recent study completed by the American Veterinary Medical Association, American Animal Hospital Association, and the Association of American Veterinary Medical Colleges calls for fundamental shifts in veterinary education to fully equip students for work in their chosen fields. Many of the study's suggestions already are in place at the College, but we are looking to further enhance our PVM program.

We accomplished much in 1999, and with the continued support of our faculty, staff, students, alumni, and friends, 2000 promises to be a good year, too. I don't think it will be any quieter, and I probably won't have much time to reflect, but at least I won't have to worry about that pesky Y2K bug. Thanks again for all your support. ■

Sincerely,

James L. Voss, D.V.M., M.S.
Dean

Looking for Cures, Vaccines, and Clues – Mycobacteria Research Laboratories at Colorado State University Tackle Global Killer

In the middle of a crowded city street in southern New Delhi, there stands an iron obelisk. Local legend has it that if you can wrap your arms around the base of the obelisk, your wish will come true. It's a bit of magical thinking in an otherwise tragic place, for across the street from the obelisk, weighed down with the death that rattles within its walls, sits a tuberculosis hospital. It is a place where people come to die. And no amount of magic can change that.

When Dr. Ian Orme first began to study the bacterium that causes TB, it was more of a scientific pursuit. The bacterium seemed to defy the ordinary constraints and rules that govern other bacteria. When Dr. Orme visited India, his work took on a face. It was the face of TB as seen in its victims, and Dr. Orme returned to pursue his research with a new sense of purpose.

For Dr. Patrick Brennan, the effects of TB have haunted him since his childhood in Ireland. While most Americans today have never seen end-stage tuberculosis, he lived in a place where death from the disease was commonplace. The face of TB called to him from his childhood as he set out to battle the disease.

His mission took him to Colorado State University, where he, together with Dr. Orme and other team members, helped to create the largest research effort of its kind devoted to understanding, treating, and perhaps even eliminating diseases caused by the family of bacteria known as mycobacteria. Though the majority of work done at Colorado State focuses on *Mycobacterium tuberculosis*, researchers here also study *M. leprae*, the bacterium that causes leprosy; and *M. avium*, the cause of an



Michael Scherman, a senior research associate in the Department of Microbiology, works in Dr. Mike McNeil's lab. He screens thousands of compounds, some of which are shown in the refrigerator above, looking for ones that may inhibit the action of enzymes important to M. tuberculosis.

opportunistic infection in AIDS patients.

More than 70 people work in the Department of Microbiology's Mycobacteria Research Laboratories. Eight principal investigators, working with graduate and undergraduate students, technicians, and support staff, are involved in this comprehensive mycobacteria research program.

Dr. Julia Inamine studies the molecular genetics of mycobacteria. Her efforts currently are directed at *M. avium*. Dr. Delphi Chatterjee, a carbohydrate chemist, is defining the structure of liparabinomannan (LAM) from various strains of mycobacteria. Dr. Andrea Cooper studies the immunology of mycobacteria species. Dr. Brennan focuses on biogenesis of the cell wall and definition of

mycobacteria genome and phenotype. Dr. Orme's lab studies immunology and therapy of mycobacterial diseases. Dr. Mike McNeil's lab examines the structure of arabinogalactan, a building block of the cell wall. Dr. John Belisle looks at the proteins of the cellular envelope of mycobacterium species. Dr. Dean Crick's laboratory studies lipid synthesis in mycobacterial species. In addition to basic research, a number of the principal investigators also participate in the development, screening, and testing of TB drugs and vaccines.

Unraveling the Mystery of the Mycobacterium

Dr. McNeil, a carbohydrate chemist with the Mycobacteria Research Laboratories, holds up a complex diagram filled with arrows, acronyms, numbers, letters, and symbols representing the basic chemical building blocks of the cell wall of *M. tuberculosis*. He points to a small section.

"Understanding this cell wall represents work begun in the 1930s, work done in laboratories involving hundreds of people around the world," Dr. McNeil comments, "and includes some important work done here at Colorado State. If we can find something in the cell wall, if we can find a weakness, a place we can effectively attack with drugs, it's work well spent."

To defeat TB, scientists must first understand the bacterium that causes it or at least understand enough to prepare an effective defense.

"We are working to understand how the mycobacterium survives and lives. We want to explore its metabolic pathways, gain insight into nutrition requirements for replication, and learn what is unique about its living process that it doesn't share with its mammalian host," said Dr. Brennan. "We know one unique feature is the bacterium's cell wall. We have spent years defining the cell wall chemically and now have discovered the synthesis of the cell wall."

“Physicians don’t have many choices in treating TB – only four drugs are available – and drug-resistant strains of TB are becoming common.”

Dr. Chatterjee is working to understand how the TB mycobacterium survives in the host, looking especially at the role of the carbohydrate lipoarabinomannan. Dr. Crick is looking at the enzymes that are involved in isoprenoid biosynthesis. Isoprenoid compounds are essential precursors of several critical bacterial components such as the cell wall and electron transport systems. Understanding the mycobacterium at a molecular level is just one facet of the basic research underway here. Researchers also are working to understand the immunology of the diseases for which mycobacteria are responsible.

“The main interest for our lab is the basic immunology of tuberculosis, which is still poorly understood,” said Dr. Orme. “It is difficult to work with the lungs — they are not designed for immune system



Dr. Delpbi Chatterjee, a lead researcher with the Mycobacteria Research Laboratories, shows a graphic illustration of some of the lab's work on defining the mycobacterium cell wall.

studies — and the chronic disease state is not well understood. Another issue we are concerned with is the effect of aging on the disease. We find that people over 65 are more susceptible to secondary tuberculosis and we're not sure why.”

Drug resistance also is an area of interest in TB research. Physicians don't have many choices in treating the infection — only four drugs are available — and drug-resistant strains of TB are becoming common among Russian prison populations, where 50 percent of the popula-

tion is TB positive, and in Baltic countries, where 30 percent to 40 percent of isolates are drug resistant. On a worldwide scale, between 10 percent and 12 percent of TB cultures are drug resistant. Learning more about the immunology of TB can help researchers understand problems with drug resistance.

Drug Development and Testing Plays a Vital Role in Laboratories' Work

Mike Scherman is looking for the proverbial needle in the haystack. He is part of the team that is screening compounds that may be effective in inhibiting the action of enzymes important to the growth of *M. tuberculosis*. Thousands of compounds are being screened to determine their activity against specific enzymes. Scherman, who did his undergraduate work at Colorado State and is now a research associate, even screens plant extracts sent by a colleague.

“Some of these plant extracts have shown a strong effect on the active enzyme,” Scherman said. “But the extracts are a compound soup and we really don't know what exact mechanism is at work when we see enzyme inhibition.

Still, it's another good reason to save the rain forests.”

Scherman works in Dr. McNeil's lab, where the focus is on the development of new TB drugs. The fortress-like cell wall of *M. tuberculosis* may hold the key. The tuberculosis bacterium's wall is comprised of a mycolic acid layer and a peptidoglycan layer held together by an arabinogalactan tether. If inhibitors of this tether can be found, they may be effective drugs against tuberculosis and will not be toxic to the host.

“We easily can pick up antigens that show up in late-stage tuberculosis, but the challenge is to diagnose people and pick up the infection before they get to that stage.”

As evidenced by the work in Dr. McNeil's lab, researchers must understand the bacterium's processes, then find drugs to knock out or disrupt those processes. Once the molecules are shown to have an effect on the desired enzyme(s), their action in culture is examined. If they show action against the bacterium in culture, mouse model studies are undertaken to explore effectiveness and possible toxicity. One area of expertise at Colorado State is the development of animal models for TB drug and vaccine screening. Dr. Orme's team shoulders the bulk of this work. His lab screens drugs from around the world and works to improve mouse and guinea pig models of TB.

Improving Diagnostic Tools Crucial to the Battle Against Tuberculosis

Before you can treat tuberculosis, you have to diagnose it. In developing countries, early-stage tuberculosis can be difficult to diagnose. Skin testing is not used, microscopic examinations of sputum require cell cultures to grow for two to six weeks, rural areas make travel difficult, and sputum tests must be conducted three times, to say nothing of the fact that money for testing is tight.

These factors set up a series of events that worsen the infection's impact on local populations. Drug treatment is delayed, the infected individual is more likely

Looking for Cures, Vaccines, and Clues

continued from page 5

to infect others, and long-term health is severely compromised. Delays in diagnosis also can lead to premature death. If Dr. Belisle's studies come to fruition, this situation one day may be remedied.

His lab is looking at the proteins involved in early-stage TB infection and the proteins involved in regulating the bacteria's growth. He hopes to develop drugs that cause the bacteria to cause its own death by overproducing particular proteins, but a more immediate application of his work is to enhance TB testing.

"We have worked along this line for a long time with lots of failures," said Dr. Belisle. "We easily can pick up antigens that show up in late-stage tuberculosis, but the challenge is to diagnose people and pick up the infection before they get to that stage. Working with AIDS patients, we now are able to pick up particular antigens long before the patients show evidence of tuberculosis."

Researchers at Colorado State, working in cooperation with colleagues at New York University, have applied for a patent for the antigen and hope to bring the TB test to the commercial market.

"This won't replace current skin and sputum testing, but it will complement these tests and can be an early warning signal," Dr. Belisle said. "Rapid diagnosis can lead to earlier treatment, and that really can make a difference."



Dr. Ian Orme, one of the founders of the Mycobacteria Research Laboratories, is at home in the laboratory where his many research interests in mycobacterium include vaccine development, aging and immunity, and improvements in animal models for tuberculosis.

Vaccine Development Holds Best Hope

Like small pox, polio, rabies, and tetanus, the best hope of winning the battle against TB and other infectious diseases is an effective vaccine. But this is not an easy task. The BCG vaccine for TB available now is most effective in children and, in many countries, simply serves to delay the onset of acquisition of the infection rather than supporting true prevention. Researchers at Colorado State are an integral part of the hunt for a new vaccine.

Dr. Orme's lab, in addition to developing animal models to test vaccines, is continuing investigations into the identity of mycobacterial proteins that elicit a protective immune response from the host. These proteins could be the major components of new vaccines against tuberculosis.

"The vaccine side is slower than the drug development side, where I can see the development of a compound that actually kills tuberculosis," Dr. Orme said. "For vaccines, I'd say that if '10' were the perfect vaccine, we are at about a '5' right now. We can chip away at the other five parameters, but a good vaccine is definitely a longer-term dream. We'll get there; it's just going to take some time."

Federal support for research into tuberculosis is allowing for the rapid growth of Colorado State's Mycobacteria Research Laboratories. Vaccine, drug, and *M. tuberculosis*

studies are funded by the National Institutes of Health, which in the last six months alone provided more than \$8 million in funding for TB research at Colorado State. The Mycobacteria Research Laboratories, which are unique given the amount of expertise focusing on one problem, are part of the Infectious Diseases Program at Colorado State, a Program of Research and Scholarly Excellence.

"For vaccines, I'd say that if '10' were the perfect vaccine, we are at about a '5' right now. We can chip away at the other five parameters, but a good vaccine is definitely a longer-term dream."

"I think we comprise the largest group of people in the world working toward a common goal in terms of mycobacteria research – to prevent people dying an extremely horrible death from tuberculosis," said Dr. Orme. "This concentration of effort is simply not found anywhere else, and that makes this program quite special."

University, state, and federal support for the program is strong, and the laboratories are enjoying a major upgrade, with part of the research program moving to a new Biosafety Level 3 building located at the University's Foothills Research Campus. The new laboratory facility enables safer operating conditions, more space for faculty and students, and state-of-the-art laboratory equipment to continue the laboratories' history of research excellence.

Maybe Wishes Can Come True

Dr. Chatterjee, who is originally from Calcutta, India, goes home every year and always visits New Delhi. Although she knows what to expect, she nonetheless is shocked when she visits the hospitals. Shocked, she says, by the sheer number of TB patients and their suffering. Shocked, she says, by the sparse availability of treatment and the lack of follow-up.



Drs. Delpi Chatterjee (right), John Belisle (back), and Andrea Cooper (left) are lead investigators with the Mycobacteria Research Laboratories. Their efforts are leading to a better understanding of the mycobacteria that cause devastating illnesses such as tuberculosis and leprosy.

Affected by TB in her own family – her father spent time in a sanatorium because of the disease – her trips home make her even more resolute in her quest to help find treatments for TB.

Persistence, determination, innovation, and a little bit of luck one day may lead Dr. Chatterjee and other researchers at the Mycobacteria Research Laboratories to a vaccine and perhaps a cure for tuberculosis. The mycobacterium is somewhat like the obelisk in New Delhi. If researchers can just get their arms around it – explore it from the molecular level up and fully understand it – maybe their dreams of conquering TB will come true. ■

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Tuberculosis: Up Close

Tuberculosis is a chronic or acute bacterial infection, caused by the *Mycobacterium tuberculosis*, which primarily attacks the lungs. Air droplets in coughs or sneezes from an infected person usually spread the TB bacterium. Between 5 percent and 10 percent of people infected will become ill.

TB can occur in two stages, primary and secondary. Primary TB produces no noticeable symptoms. Immune system cells ingest the TB bacteria and transport them to the lymph nodes, where they may be destroyed or inhibited. TB is not contagious in this early stage.

If the bacteria multiply, then active primary TB develops. Symptoms include coughing, night sweats, weight loss, and fever. If the bacteria are inhibited, the immune cells form a wall around inactive bacteria, producing a tubercle. As long as the immune system remains strong, the TB bacteria may remain dormant for many years. If the immune system becomes weakened, the infection

may develop into secondary TB. Causes for weakened immune systems include immunosuppression from disease (especially HIV) or medical therapy, diabetes, older age, malnutrition, and other medical factors.



Each mycobacterium has a cell wall that acts as a fortress. Defining the cell wall has been a focus of the work at Colorado State and should help researchers design and develop drugs and vaccines that can effectively overcome this stronghold.

In secondary TB, bacteria destroy tissue in the lungs, and the infection may spread to the rest of the body. Fluid or air may collect between the lungs and the lining of the lungs, destroying lung tissue and causing severe coughing of blood and/or phlegm. It is in secondary TB that people become infectious.

Drugs are the main method of treating TB, though bacterial resistance to drugs can be a problem. Therapy includes multiple drugs given for at least 6 months and often for as long as 12 months – difficult in developed nations, but almost impossible in Third World countries where TB is rampant. The only available vaccine is BCG, which is most effective in children. ■

Human History Closely Linked to History of Tuberculosis

In his autobiography, *Angela's Ashes*, one of author Frank McCourt's central characters is not a person, place, or thing, but a disease. Consumption, known today as tuberculosis, permeated the lives and deaths of many of the people who populated McCourt's world. The disease was not prejudicial in selecting its victims – young or old, rich or poor, men or women – all were at risk, though some more than others. McCourt's Irish town of Limerick, like so many European and American cities in the early 1900s, was awash in the bacterium that causes a slow and painful death.

TB is found throughout human history and is indeed a causative agent of much human history. References to the disease are found in the writings of ancient Babylonia, Egypt, and China. Early Spanish explorers brought the disease to the Aztec Empire in Mexico, nearly eradicating the native Nahuatlan populations. Colonial powers brought the disease to Africa and the South Pacific islands, and today developing countries export the disease back to North America and Europe.

TB appeared in epidemic form in the 19th century. During the height of the U.S. tuberculosis epidemic, one in four people died of the disease. American and European scientists began researching the dis-

ease in the early 19th century and did make some progress. In the 1870s, American physician Edward Trudeau discovered that fresh mountain air could lessen symptoms. In 1885, he built the first American sanatorium, which soon became the mainstay of TB treatment.

In 1882 Robert Koch, a German doctor, discovered the bacterium that causes TB, *Mycobacterium tuberculosis*, and demonstrated how the disease is spread. In 1924, French bacteriologists Albert Calmette and Camille Guerin prepared a somewhat successful vaccine, known as BCG. (BCG is most effective in preventing TB in childhood.)

In 1944, the antibiotic streptomycin was discovered – the start of effective treatments for the disease. Other factors that reduced the rate of TB infection in the industrialized world included im-

provements in nutrition and housing, better ventilation of homes and work sites, pasteurization of milk, and isolation of highly infectious TB cases in sanatoriums. TB became more a disease of poverty, but

continues to reign as the leading cause of death worldwide from infectious disease.

The World Health Organization estimates that approximately one-third of the

global population is infected with *M. tuberculosis*, and that seven to eight million new cases of TB occur each year with two to three million people dying from TB annually. Most TB cases and deaths occur in developing countries located mainly on the Asian and African continents.

In the United States, the incidence of TB decreased rapidly between 1953 and 1983. The rate, however, jumped up 20 percent from 1985 to 1992. This increase was attributed to the human immunodeficiency virus (HIV), increases in immigration from endemic areas, urban homelessness and drug abuse, and a compromised public health infrastructure for controlling TB. Another alarming trend was the increasing rate of drug-resistant TB. Programs since have been put into place for TB drug compliance and TB education, reducing infection rates.

Though the rates of TB infection have slowed in the United States since 1992, the disease remains a major cause of concern for U.S. health officials, physicians, researchers, and at-risk populations. Scientists continue to search for better treatments, an improved vaccine, and a clearer understanding of the disease in hope of one day eradicating it from the history of the humans it has plagued for so long. ■

“Though the rates of TB infection have slowed in the United States since 1992, the disease remains a major cause of concern for U.S. health officials, physicians, researchers, and at-risk populations.”



The Glenwood Sanatorium in Glenwood Springs, Colo., was built by Dr. W.F. Berry in 1908 and housed many tuberculosis patients over the years. The town's most famous patient, gunslinger John H. "Doc" Holliday, moved to Glenwood Springs in 1887, long before the sanatorium was built, to take the hot springs' waters and vapors for his tuberculosis. He died later that same year.

Microbiology Alumnus Mines Gold with Help of Billions

To most people, gold mining conjures up images of hard-hatted workers trudging into mine shafts, hammer in hand, striking away at veins of yellow riches. Dr. Jim Brierley's gold miners don't quite fit that image, but his hard-working microorganisms get the job done quite well, thank you very much.

Dr. Brierley, a 1961 graduate from the Department of Microbiology (then the Department of Bacteriology), is a specialist in microorganism-metal interactions, putting his expertise to work at Newmont Mining Corporation. He heads research into the use of biotechnology for the recovery of metals and minerals.

"These microorganisms basically are miners that work for food," said Dr. Brierley. "They first were discovered by individuals who were researching the origins of acid drainage from coal mines in the 1940s. Researchers found that microorganisms were attacking the pyrite in coal, and the acid was one of their waste products."

The industrial uses of such metal/mineral-eating organisms soon became apparent. In the 1950s, Kennecott Copper Corporation began using microorganisms for bioleaching copper from copper sulfide mine waste. Processes for gold first were developed in South Africa, where treatment of pyrite concentrate from refractory ore enabled the recovery of gold from the solid residues.

"In refractory ore, the precious metal is locked in a mineral matrix, usually pyrite, and is not easily recovered until the pyrite is removed from the system," Dr. Brierley said. "Conventional ways to remove pyrite are the roaster and pressure autoclave, where the pyrite is oxidized and the gold exposed. But the sim-

plest and cheapest way is to use bacteria to break the pyrite down to iron and sulfate and expose the gold."

This method also is considered more environmentally friendly, noted Dr. Brierley, as it produces no gaseous emissions and less acid. At Newmont, Dr. Brierley's challenge was to develop a method that would allow biooxidation of whole ore, rather than the concentrates typically employed in plants in South Africa and the rest of the gold-producing world. His work in recovery of gold from whole ore has brought Newmont several new patents. The fruits of his labor are now on display at Newmont, which has recently opened the first commercial plant of its kind to treat whole-ore heaps. The plant, located in Nevada, processes 2.5 million tons of rock at a time.

The whole-ore heaps, which measure 500 by 1,000 feet, are 30 feet high and inoculated with bacteria suitable for the heap's unique environment. Different bacteria are used in different phases of the heap. For example, the heap takes 150 to 270 days to mature and complete recovery of the gold. During that time, internal temperatures can reach 167°F. At these temperatures, certain bacteria are killed, while others thrive. Dr. Brierley said research is continuing, as the commercial application of the technology presents new sets of problems to solve.

"The work is truly fascinating," Dr. Brierley said. "It's quite interesting to be working with these microorganisms that thrive in extreme environments and use inorganic materials as their energy source. They are quite hardy and unique."

Dr. Brierley's interest in microorganism-metal interactions took root at Montana State University when he was work-



Dr. Jim Brierley

ing on a Ph.D. project that focused on these interactions and their importance in establishing the chemistry of Yellowstone National Park's hot springs. In this study, he discovered a microorganism that oxidized sulfur and iron compounds at high temperatures. This organism subsequently was named *Acidianus brierleyi* in recognition of Dr. Brierley's findings.

After receiving his Ph.D., Dr. Brierley joined the faculty at the New Mexico Institute of Mining and Technology, where he taught a broad curriculum of microbiology courses and initiated an applied research program focusing on microbial technologies for mineral bioleaching and metals bioremediation. He served as chairman of the institute's Department of Biology from 1979 to 1984, when he left to become research director for his wife Corale's start-up company, Advanced Mineral Technologies. In 1988, he joined Newmont where he continues to work today in microbe-metal phenomena.

In recognition of his accomplishments in this field, including a number of patents and a microorganism being named for him, Dr. Brierley has received the prestigious Milton E. Wadsworth Award from the Society for Mining, Metallurgy, and Exploration. Dr. Brierley also is a select member of the College of Veterinary Medicine and Biomedical Sciences' Glover Gallery of Distinguished Faculty and Alumni. ■

"These microorganisms basically are miners that work for food. They first were discovered by individuals who were researching the origins of acid drainage from coal mines in the 1940s."

Challenges of New West Spur Development of Resource Management Program

When the American West was first being settled by pioneers in the 1800s, the one word that may have best described the new land was abundance. There was an abundance of land, wildlife, water, and timber and mining resources. Early settlers could not have imagined that this land of plenty one day would be torn by divergent interests, burgeoning populations, and a New West that counted more cars and condos than cattle.

Today, the western United States finds itself in just such a conundrum. The demands on the natural resources of the region are beginning to outstrip the land's ability to provide them – unless lasting changes are made to the way these resources are managed. The Western Center for Integrated Resource Management at Colorado State University hopes to affect these changes by offering a comprehensive program that will tackle these interrelated challenges through education, research, and outreach.

“The primary goal of IRM is to graduate land managers who are capable of dealing with today's complex management problems,” said Dr. Gordon Niswender, director of the Western Center for Integrated Resource Management. “We also provide continuing education for practicing land managers looking to refresh and further develop their skills to meet present and future challenges.”

In addition to rising populations, western lands face changing circumstances that are impacting their management. Dr. Niswender said nonresident, non-agricultural owners who are looking to preserve an idealized western way of life are purchasing bigger and bigger chunks of the western United States. They want qualified land managers capable of operating in a global economy, while preserving local qualities.

“We also are concerned about the family ranch falling by the wayside,” Dr. Niswender said. “People can't operate their ranches the way their fathers and

grandfathers did and stay in business. They have to understand marketing, the global economy, land, water, wildlife management, and so much more. If we are going to keep the family ranch as a viable, functional unit, we have to provide well-trained managers.”

The IRM program offers a bachelor's degree in integrated ranch resource management and is developing a new inter-

national markets and issues are incorporated into the program.

The Western Center for Integrated Resource Management also offers community-based programs that focus on K-12 educational objectives, funded in part by the USDA Fund for Rural America. One program, underway at Prairie Road High School, enables students to incorporate agricultural technology classes into their high school curriculum.

Continuing education and outreach programs allow professionals in complementary fields to work together to manage lands for sustainable use as well as preservation.

The complementary fields include Division of Wildlife, Forest Service, Bureau of Land Management, banking, tourism, recreation, equine science, food animal veterinary medicine, the dairy industry, conservancy groups, and others.

“What we are doing has required a major change in our fundamental philosophy,” Dr. Niswender said. “We always have done a good job of teaching each discipline – economics, genetics, nutrition, and the like – but that's not the real world. We have to teach how we interact in the global economy and how all these disciplinary areas function together. We must teach how to be more efficient and more productive, but not necessarily how to produce more.”

The Western Center for Integrated Resource Management is supported by the colleges of Veterinary Medicine and Biomedical Sciences, Agricultural Sciences, and Natural Resources. Faculty and staff come from seven different departments and the Colorado Agricultural Experiment Station and Colorado State University Cooperative Extension. Private funding also is being sought to support and develop the programs offered by IRM. For additional information, contact Dr. Gordon Niswender, (970) 491-5621, or co-director Dr. Ronnie D. Green, (970) 491-2722. ■

Western Center for Integrated Resource Management

disciplinary master's degree in the same field. The existing Integrated Livestock Management Program will complement the proposed IRM graduate program. Graduates of the undergraduate program will have a good knowledge of land, livestock, water, wildlife, and recreational, financial, and human resources and their interactions. Good communication and leadership skills and knowledge of inter-

New Adviser Helps Students Make the Grade

CVMBS students in the biomedical sciences and pre-veterinary program, or prospects for the Professional Veterinary Medical program, now have a new place and person to go to for resources, assistance, and advising. Mark Brown has joined the College as an adviser, working out of the Center for Life Sciences in Aylesworth Hall.

"We have needed someone like Mark for quite some time and are thrilled to have him here helping our students," said Dr. Sherry McConnell, CVMBS associate dean for admissions and advising. "His ability to give our students his full attention means they will have professional guidance, attentive advising, and a dedicated liaison for better communications with faculty and staff."

In addition to his counseling role, Brown serves as faculty adviser to the Pre-Veterinary Club and to the special interest floors in the residence halls. He is a

1998 graduate of Colorado State University and currently is taking part-time, graduate-level course work.

Brown has a half-time appointment in the College and a half-time appointment in the Center for Life Sciences. The center, funded by the Howard Hughes Medical Institute, provides a wide range of counseling, resources, and educational and career information and opportunities for life science students.

"In particular, the veterinary school prospects who come to me are very passionate and serious about their desire to be admitted to veterinary school," said Brown. "One advantage I can give them is my first-hand knowledge from the Veterinary Admissions Committee as to what it takes to make a student competitive."

For additional information on the advising program or to make an appointment with Brown, contact the Center for Life Sciences at (970) 491-3658. ■

Student Selected as Ballard Representative

The Morris Animal Foundation has announced the selection of Stephen Cassle as the College of Veterinary Medicine and Biomedical Sciences' new Ballard student representative. There are now 27 students involved with the program at veterinary institutions throughout the United States.

The primary responsibility of the Ballard student is to educate students and faculty at his or her school about the foundation's role in supporting animal health research. The students attend a training activity at the foundation's annual meeting and receive a stipend for their activities. The Ballard program is named for the late Joseph Ballard Jr., who was president of the foundation from 1977 to 1982 and chairman of the board from 1982 to 1983. ■



1999-2001 Morris Animal Foundation Ballard Student Stephen Cassle with President Emeritus and Trustee Betty White.

Oldest CVMBS Graduate Dies at 105

He was born in a log cabin on his parent's ranch near Sedalia, Colorado, on August 25, 1894. He attended a one-room schoolhouse. He graduated from Colorado Agricultural College (now Colorado State University) in 1918 with a degree in veterinary medicine. He saw the advent of electricity, cars, telephones, indoor plumbing, air travel, space travel, great wars, great depressions, and great achievements.

Dr. Charles Chase, who his daughter Shirley Chase believed was the oldest veterinarian in the country, died October 2 at the age of 105. His wife, Helen, and his daughter survive him.

"He loved his university and his profession and served them well during his long life," wrote Shirley Chase in a letter to Dr. James Voss, dean of the College. Dr. Voss had visited with Dr. Chase in 1994, when Dr. Chase celebrated his 100th birthday in his California home.

Dr. Chase enjoyed a 35-year career as a veterinarian with the U.S. Department of Agriculture, Bureau of Animal Industry, which began immediately following his graduation from Colorado State. In 1955, he retired from federal service to take a similar position with the State of Oregon in Portland. He retired in 1962 at the age of 68.

After retirement, Dr. Chase and his wife enjoyed traveling in the mainland United States and Hawaii. Dr. Chase wrote travel journals, and was an avid reader and music aficionado. He also volunteered at the Portland Zoo, assisting with the care of exotic animals.

"Dr. Chase lived an incredibly rich and full life, and he was truly a credit to his profession," said Dr. Voss. "His love of life, energy, and integrity serves as an example to us all." ■

Environmental Health Professor Takes Genetic Path to Assess Risk of Toxins

When biologist/author Rachel Carson published her book *Silent Spring* in 1962, the public outcry that followed helped create the Environmental Protection Agency, a ban on DDT and PCBs, curtailment of the use of persistent pesticides in the environment, and sparked what is considered to be the beginning of the environmental movement.

Today, almost 40 years later, Dr. Bill Hanneman works in his laboratory with the same toxins Carson featured in her book. These toxins, despite bans and clean-ups, still are prevalent in our environment and still are causing health concerns for humans and animals. Dr. Hanneman, an assistant professor of toxicology in the Department of Environmental Health, explores the effects of these chemicals on gene expression in mice, ultimately hoping to assess risk in humans using basic molecular mechanisms.

“The research we do involves using genetic knock-out and transgenic technology to study the effects of dioxin and PCBs on gene expression,” said Dr. Hanneman. “About 89 percent of the genes expressed in mice also are expressed in humans, so we can learn a lot about the basic molecular effects of a given chemical in rodents and then apply these data to humans.”

When Carson wrote her book, studies like the ones Dr. Hanneman conducts were simply unthinkable. He is able to take the chemical to the genome, knock-out or add genes, and study the effects of dioxin and other chemicals on gene expression. Carson’s book was based more on observation, while Dr. Hanneman’s work, supported by the National Institutes of Health, is based on molecular studies that can clearly show the toxins at work.

“We employ a strategy known as gene trapping,”

said Dr. Hanneman. “We take mouse embryonic stem (ES) cells and randomly insert a reporter gene construct throughout the genome. Then we add dioxin to the mix, and the reporter gene shows us where in the genome the dioxin is having an effect. Because this process is done in mouse ES cells, we then can create knock-out mice that have a disruption in a dioxin-specific gene, thus allowing us to determine what the effect may be on the whole mouse.”

The research is complex and technically demanding, said Dr. Hanneman. Part of the challenge is that the mouse genome is not fully sequenced, so it isn’t clear which genes are responsible for what in every case. In this situation, the full effect of human exposure to dioxin contamination may not be understood until form and function come together. The reason for this, noted Dr. Hanneman, is that even though one may know the sequence of every gene, the genetic function of a gene only can be revealed by alteration (for example, a mutation) of the gene in question and subsequent analysis of the phenotype in a model system such as the mouse.

“If we understand what genes are affected by any given chemical, we can start to look at global gene expression studies and gain a better understanding of the toxins in our environment and how they are impacting us,” said Dr.



Dr. Bill Hanneman

Hanneman. “Another of our goals is to have ES cells containing our reporter construct stored and available to researchers around the world. Obviously, we can’t study every gene that responds to the chemicals we are testing, but we can provide the base material to other scientists.”

It’s likely that these chemicals will be with us for some time, and new ones constantly are being introduced that fight the battle against insects and weeds, enable manufacturing, expand agriculture, and fight disease.

“It is a daunting task,” Dr. Hanneman said. “Manufacturers generally produce chemicals that are thoroughly tested and deemed safe. Once in a while, something goes wrong. We work to understand what happened and, with the benefit of hindsight, prevent similar situations from arising.”

Dr. Hanneman joined Colorado State University in 1999. He is a graduate of the University of California-Davis, where he studied animal science, reproductive physiology, and molecular toxicology. His postdoctoral work was in genetic engineering. Dr. Hanneman joined Colorado State from the Jackson Laboratory in Bar Harbor, Maine, a non-profit research institute. ■

Five Facts About Toxins in Our Environment

1. Volcanic eruptions are a common source of dioxin.
2. Beluga whales in the St. Lawrence River contain such high levels of PCBs that they qualify as hazardous waste when they die.
3. It takes the average breast-fed U.S. baby six months to receive the maximum recommended lifetime dose of dioxin.
4. Since PCBs were banned, levels of the chemicals in Great Lakes fish have increased slightly in some areas.
5. Florida panthers are nearing extinction in part due to the effects of toxic chemicals. Male panthers suffer from greatly diminished sperm counts and undescended testicles. ■

C VMBS Science Program Seeks to Capture Hearts and Minds Early

If he were alive, Edgar Allen Poe could have written a great story about this. It might have been called “The Telltale Hearts” and featured a class of fifth graders who conduct guided studies of sheep hearts. But instead of the hearts keeping them up all night, the hearts turn them on to science. In Poe’s story, all the students go on to great careers in medicine and the biomedical sciences, and one of them wins the Nobel Prize for discovering a cure for cancer.

All right, so maybe that’s not dark enough for Poe, but the material works for Dr. Sherry McConnell. Dr. McConnell, CVMBS associate dean, heads up the College’s K-12 Science Connection program, which provides science-learning activities to school children in Northern Colorado. The goals of the program are to get students excited about science at a young age and show students, through hands-on activities and interactions with University faculty and students, the wide range of careers available in the medical, biomedical, and veterinary sciences.

“Many of our faculty were doing activities independently, so part of Science Connection is to coordinate K-12 outreach, justify the time spent doing this type of outreach, and recognize and reward faculty, staff, and students for their efforts,” Dr. McConnell said. “Another important aspect of the program is it allows for outcomes assessment – we know intrinsically this is the right thing to do; now we’ll be able to prove it.”

Anecdotally, the program already has proven its worth to participants. Recently, Dr. McConnell was joined by veterinary student volunteers to assist fifth-grade students in heart dissections (the sheep hearts came from a packing plant) at Werner Elementary in Fort Collins. The students had been studying a healthy lifestyle, including diet and



Students at Werner Elementary School in Fort Collins get hands-on experience when dissecting sheep hearts to better understand how the heart works.

exercise, and how the heart functions. Working in small groups with veterinary students, each fifth grader had the opportunity to feel, touch, and probe the sheep hearts. Calli Kornblau said she and her classmates were very excited about the activity.

“We did cow eyeballs before, and that was scary and made me feel a little queasy,” she said. “I was kind of nervous



Students in the Professional Veterinary Medical program are an essential part of K-12 Science Connection. They act as teachers, mentors, and friends, inspiring in children an interest in the sciences.

about the heart stuff, but it’s a lot of fun and really interesting. We learned in class about the heart, so it’s really cool to see the real veins and arteries and muscles. We also get to see how the heart can get covered with fat and the arteries all clogged up – that was gross, but makes us want to keep our hearts healthy.”

Michelle Boyle, who team-teaches the fifth grade class with Jim Stage, said the expertise CVMBS faculty and students bring to her classroom makes all the difference.

“I probably could do a passable demonstration with one heart, but there’s no way we could offer this quality of experience on our own,” Boyle said. “It really grabs the students and turns them on to science.”

Guided heart anatomy programs are only one of many activities offered through K-12 Science Connection. More than 20 CVMBS faculty and staff regularly are involved in other outreach activities, with an additional 50 chipping in occasionally. Other activities include anatomy tours and demonstrations (also a useful student recruiting tool), faculty shadowing, veterinary hospital tours, specialty programs in elementary schools, and more. Jean Carpenter, at the University’s Center for Life Sciences, coordinates logistics for the program, matching outreach activities to fit an individual school’s needs. Dr. Tom Gorell, director of the Center for Life Sciences, co-leads the program with Dr. McConnell.

“Although our faculty members have been doing these activities for years, the K-12 Science Connection program is in its infancy,” Dr. McConnell said. “We are very excited about bringing the amazing world of science to as many children as possible, and this program will help us do that.”

As Calli Kornblau put it, science can be “gross but cool,” and that’s something even Edgar Allen Poe would appreciate. ■

Professor Emeritus Receives Honorary Doctorate

Dr. William V. Lumb, a pioneer in the field of veterinary surgical research, recently was awarded an honorary Doctor of Science from The Ohio State University. Dr. Lumb is professor emeritus in the Department of Clinical Sciences and retired director of the Surgical Laboratory, which was then located at the Foothills Research Campus.

As director of the Surgical Laboratory from 1963 until 1978, Lumb worked to bridge the gap between human and veterinary surgical and anesthesia research by forming a faculty consisting not only of veterinarians, but also physicians, engineers, and laboratory technicians. This multidisciplinary collaboration resulted in a better understanding of health issues for both human and animal patients.

“Many of the advances in veterinary medicine we take for granted today are a direct result of the work done by Dr. Lumb,” said Dr. James Voss, dean of the College. “We are very proud that he was,

and is, such an important part of this College. His pioneering work in veterinary medicine is an ongoing inspiration to our students and faculty alike.”

A native of Iowa, Lumb received his Doctor of Veterinary Medicine from Kansas State University in 1943. Following service in the U.S. Army Veterinary Corps,



Dr. William V. Lumb (left) receives congratulations from William E. Kirwan, President, The Ohio State University.

he received a master's degree from Texas A&M University in 1953 and a Ph.D. from the University of Minnesota in 1957. Dr. Lumb joined the faculty of Colorado State University as an associate professor in 1954. In 1958, he took a position in the Department of Surgery and Medicine at Michigan State University, returning to Colorado State's Department of Clinics and Surgery in 1960. He was named professor and director of the Surgical Laboratory in 1963 and retired as professor emeritus in 1982. In 1986, he spent a semester teaching at Ross University in St. Kitts, West Indies.

Dr. Lumb was instrumental in forming the American College of Veterinary Surgeons and the American College of Veterinary Anesthesiologists and served as president of the former and as editor of its journal, *Veterinary Surgery*. He is president and CEO of the Lubra Co. and holds patents on a prosthetic vertebra and on plastic spinal plates. ■

Paws for a Cause Campaign

The Animal Cancer Center and the Argus Center at Colorado State are embarking on an exciting new adventure. The plan is to build a new wing at the Veterinary Teaching Hospital to expand cancer treatment and research and enhance pet family support.

The new wing will be built largely with private funding. The generous gifts to date will be supplemented with a public campaign called “Paws for a Cause” beginning during National Pet Week in May.

The “spokesbear” for the campaign is Bart the Bear™, who has appeared in many television programs and movies. Bart is a cancer survivor who received treatment at the Animal Cancer Center. He has agreed to help out his fellow four-

legged friends by using his celebrity status to deliver the Paws for a Cause message.

ClayPaws™, a kit many of the staff at the Veterinary Teaching Hospital use to make paw prints of beloved pets for clients, will be used as an incentive for gifts from the general public. A \$50 or greater donation to the building fund will assure donors receive a ClayPaws™ kit and detailed information about the new wing.

If you would like to make a donation to Paws for a Cause or would like to receive additional information about the Animal Cancer Center, Argus Center, new wing, or other donor programs, call our toll-free number at 1-877-4CSUVET (1-877-427-8838). Thanks! ■



Doug Seus and Bart the Bear™ are helping raise awareness of cancer in pets. Bart, who has appeared in many movies and television shows, was a patient at the Animal Cancer Center and is now spokesbear for Paws for a Cause. Seus is his trainer and owner.

Withrow Receives Career Achievement Award

Dr. Stephen Withrow recently received the American Kennel Club's Career Achievement Award in Canine Research, given in recognition of extraordinary contributions to the field of canine research.

Dr. Withrow, a professor in the Department of Clinical Sciences and director of Colorado State's Animal Cancer Center, pioneered procedures including limb sparing and major facial reconstruction techniques that have greatly advanced the quality of care for canine cancer patients. In addition, he has contributed to advances in the diagnosis, grading, progn-



Drs. Stephen Withrow (left) and Bill Dernell (right) consult on the treatment options for a patient. Dr. Withrow has been instrumental in developing the world-renowned Animal Cancer Center at Colorado State.

sis, and treatment of numerous canine and feline neoplasms. Because of Dr. Withrow's efforts, cancer patients that were once routinely euthanized now are diagnosed and treated.

"We are indeed fortunate to have an individual of Dr. Withrow's caliber and character in our College," said Dr. James Voss, dean of the CVMB. "This recognition honors all the hard work he and his team have done, and continue to do, in the fight against cancer. We are very proud of Dr. Withrow and the ambitious goals he and his team have for their work in cancer research and treatment."

Dr. Withrow has been awarded more than \$14 million in research grants to study canine oncology from such sources as the National Cancer Institute of the National Institutes of Health. He received the Norden Distinguished Teacher Award, Professor of the Year, Purina Research Award, and the Gaines Veterinary Award from the University of Saskatchewan. Colorado State University has presented him with an Alumni Faculty Award. He also received the Outstanding Faculty Award from the Colorado Veterinary Medical Association.

Dr. Withrow served as president of

"This recognition honors all the hard work he and his team have done, and continue to do, in the fight against cancer."

the Veterinary Cancer Society from 1984-1986. He is a member of the Orthopedic Research Society, the International Society of Limb Salvage, and the Connective Tissue Oncology Society and was the only veterinarian admitted as a Fellow to the Musculoskeletal Tumor Society. He has authored 200 refereed publications, 30 book chapters, and two textbooks, in addition to making more than 250 scientific presentations.

Dr. Withrow earned his D.V.M. from the University of Minnesota. He is a diplomate of the American College of Veterinary Surgeons and of the American College of Veterinary Internal Medicine, specialty of oncology. ■

Physiology Professor Receives National Award

The American Society of Animal Science presented the Award in Animal Physiology and Endocrinology to Colorado State University Professor Edward L. Squires at its annual meeting. The society's award is given to an animal scientist who has made outstanding research contributions in the areas of basic or applied physiology and endocrinology of animals. Protiva, a unit of Monsanto, sponsors the award.

"Dr. Squires epitomizes our notion of an ideal research scientist and educa-

tor," said Dr. James Voss, dean of the College. "He is enthusiastic about his work, encourages others in their pursuits, and is persistent in his exploration and understanding of reproductive physiology as it pertains to domestic animals."

In 1976, Dr. Squires joined Colorado State University, where he now holds a faculty position as professor in the Department of Physiology. His research work has led to breakthroughs in improving reproductive success through equine embryo transfer, artificial insemination, semen

preservation, estrous cycle control, and other procedures.

Dr. Squires is the recipient of many awards and honors including the Oliver P. Pennock Distinguished Service Award and Jack E. Cermak Outstanding Service Award from Colorado State University, the Outstanding Mentor Award from the National Institutes of Health Science Motivation Program, the Fellows Award from the Equine Nutrition and Physiology Society, and many others. ■

C ontinuing Veterinary Medical Education

Please call the Department of Clinical Sciences at Colorado State University at 1-800-457-9715 or (970) 491-8373 for further information on all course offerings. Courses are sponsored by the Department of Clinical Sciences and the Colorado Veterinary Medical Association.

For Equine Sciences Continuing Education Schedule, contact the Equine Sciences Program, Colorado State University, Fort Collins, CO 80523; (970) 491-8373; Web address: http://www.colostate.edu/depts/equine/continuing_ed/index.html.

April 2000

April 5-7, 2000 • Trimming and Shoeing for Natural Foot Balance

A course for veterinarians and farriers

Instructors: Dr. Gayle Trotter, Dr. Gene Ovnicsek, Dr. Dean Hendrickson, Dr. Barb Page, Mr. Scott McAllister

Cost: \$220

This course is designed for veterinarians and farriers to provide instruction in evaluating and preparing the foot for natural balance. Criteria for evaluation of the foot will be presented, including visual and radiographic assessments. A lab will be included that will allow hands-on foot preparation for either trimming or shoeing. Further information on the proper foot care for the treatment of laminitis also will be presented.

April 13-14, 2000 • Small Animal Ophthalmology – Update on Selected Topics

Instructors: Dr. Cynthia Powell, Dr. Julie Gionfriddo, Dr. Tanja M. Nuhsbaum, Dr. Marcia Aubin

Cost: \$375 non-CVMA member; \$340 CVMA member

This course will offer an update on oculartherapeutics, eyelid surgery, and glaucoma. The wet labs will allow participants to practice various surgeries discussed in the lectures and will include a demonstration of transcleral cyclophotocoagulation (laser surgery) for glaucoma.

May 2000

May 3-4, 2000 • Flexible GI Endoscopy

Instructor: Dr. David Twedt

Cost: \$525 (if received two months prior), \$550 (if received one month prior), \$575 (if received month of course)

Lecture Only: \$200 (Wednesday)

Technicians: \$200 (attend lecture and observe lab)

A perfect introduction or refresher including indications, instrumentation, and technique. Five hours of lecture are followed the next day by four hours of wet lab providing hands-on experience in upper GI endoscopic exam, PEG tube placement, and foreign body retrieval. Total CE hours = 9.

May 5-6, 2000 • Canine Arthroscopy

Instructors: Dr. Timothy McCarthy, Dr. Jean Francois

Cost: \$750 (if received two months prior), \$775 (if received one month prior), \$800 (if received month of course)

This seminar presents a thorough and practical overview of canine arthroscopy of the shoulder, elbow, and stifle. Indications, instrumentation,

and technique will be team-taught by two world-renowned small animal surgeons who perform canine arthroscopy on a routine basis in their practices. Six hours of lecture will be followed the next day by a five-hour practical lab. Total CE hours = 11.

May 31-June 2, 2000 • Canine and Feline Urinary/Endocrine Update

Instructors: Dr. Greg Grauer, Dr. Deborah Greco

Cost: \$350 non-CVMA member; \$315 CVMA member

Urinary Program: Overview of the most recent developments in the prevention and treatment of acute renal failure, management of chronic renal failure, and protein-losing nephropathies. Emphasis will be placed on new therapeutic agents such as calcitriol, erythropoietin, ACE inhibitors, and thromboxane synthetase inhibitors. Updates on the management of complicated lower urinary tract infections, micturition disorders, and feline lower urinary tract inflammation also will be presented.

Endocrine Program: Updates on the latest developments in pathogenesis, diagnosis, and treatment of common endocrinopathies with particular emphasis on treatment of diabetes mellitus and diagnosis of hyperadrenocorticism and canine hypothyroidism.

June 2000

June 7-8, 2000 • Medical and Surgical Emergency Course (Small Animal Program) †

Instructors: Dr. Eric Monnet, Dr. James Gaynor, Dr. Tim Hackett

Cost: \$300 non-CVMA member; \$270 CVMA member

This course is divided into three sections: emergency medicine, emergency anesthesia, and emergency surgery. Dr. Tim Hackett will review the diagnosis and treatment of the different shock syndromes. Dr. James Gaynor will review the specifics of anesthesia for the emergency patient, which presents a real challenge in private practice. The surgical aspect of abdominal trauma, emergency intestinal surgery, and peritonitis will be presented by Dr. Eric Monnet. Management of basic orthopedic emergencies will be reviewed (doctor to be announced).

June 9, 2000 • Pain Management Strategies for the New Millennium (Small Animal Program) †

Instructors: Dr. Khursheed Mama, Dr. Peter Hellyer, Dr. Ann Wagner, and Dr. James Gaynor

Cost: \$300 non-CVMA member; \$270 CVMA member

This course will review drugs used in management of pain in small animal patients and discuss new and alternative methods for pain management and drug administration. A wet lab will provide participants the opportunity to observe and practice techniques. Round-table discussion will focus on sample cases provided by participants and/or course instructors. The course will be limited to 20.

† Above two courses may be combined for a cost of \$500 non-CVMA member; \$450 CVMA member

June 12-13, 2000 • Small Animal Herbal Medicine

Instructors: Dr. Narda Robinson, Dr. Cheryl Schwartz

C ontinuing Veterinary Medical Education

Cost: \$300 non-CVMA member; \$270 CVMA member

As part of the Advanced Training in Acupuncture, Colorado State University is offering a program in small animal herbal medicine. Cheryl Schwartz, D.V.M. (author of *Four Paws, Five Directions*), is the main instructor and will present a combination of Chinese and Western herbs and how to integrate them into a small animal practice. Prior exposure to Chinese medicine principles is essential. Prerequisites include completion of the Colorado State University Basic Course in Acupuncture or an equivalent course.

June 22-23, 2000 • Small Animal Laparoscopy

Instructor: Dr. David Twedt

Cost: \$565 (if received two months prior), \$590 (if received one month prior), \$615 (if received month of course)

Lecture Only: \$200 (Wednesday)

Technicians: \$200 (attend lecture and observe lab)

A nine-hour short course introducing the small animal practitioner to the indications and technique of laparoscopy. The course will include five hours of lecture and "Black Box" training, followed by a four-hour, hands-on laboratory, in which participants will perform laparoscopy on dogs. Participative demonstrations of thoracoscopy also will be presented in the lab. Total CE hours = 9.

July 2000

July 12, 2000 • Bovine Acupuncture – Instructional Course for Non-Acupuncturists (morning); Conventional Bovine Medicine (afternoon)

Instructors: Dr. Mark Mattison, Dr. Narda Robinson (morning); Dr. Robert Callan, Dr. David VanMetre (afternoon)

Cost: \$200 (morning); \$100 (afternoon); \$300 (all day)

A special half-day morning course for non-acupuncturists to learn some simple acupuncture techniques for emergent and other problems in newborn to adult bovine. Conditions such as downer cows, calving paralysis, unresponsive cystic ovaries, anestrus, respiratory problems in newborn calves, retained corpus luteum and pyometra, indigestion with rumen atony, and winter dysentery will be addressed. Emphasis will be placed on treatment in the field in situations in which acupuncture may help, along with conventional therapy. Suggestions will be given on optimal sites to inject solutions including vitamins, vaccines, and antibiotics.

A four-hour afternoon session will discuss Conventional Bovine Medicine. Lectures will be given by Dr. Robert Callan and Dr. David VanMetre.

July 13-14, 2000 • Operative Laparoscopy and Thoracoscopy

Instructors: Dr. David Twedt, Dr. Eric Monnet, Dr. Timothy McCarthy

Cost: \$725 (if received two months prior), \$750 (if received one month prior), \$775 (if received month of course)

This exciting new course is for the clinician experienced in diagnostic laparoscopy who would like to begin exploring the world of minimally invasive surgery. Several operative techniques including full-thickness GI biopsy, pericardial resection, adrenalectomy, gastropexy, and partial lung lobectomy will be presented in a lecture format. Participants then will have the opportunity to perform several of these procedures during the five-hour lab the following day. Participant should have a basic knowledge in laparoscopy.

Total CE hours: 10.

August 2000

August 3-4, 2000 • Respiratory Disease and Diagnosis

Instructors: Dr. Brendan McKiernan, Dr. David Twedt

Cost: \$525 (if received two months prior), \$550 (if received one month prior), \$575 (if received month of course)

Lecture Only: \$200 (Thursday)

Technicians: \$200 (attend lecture and observe lab)

This course presents an overview of respiratory disease in small animals, with an emphasis on the indications and application of endoscopy as a diagnostic tool. Five hours of lecture will be followed the next day by a four-hour hands-on lab in which participants will have an opportunity to use both rigid and flexible endoscopes for rhinoscopy, laryngoscopy, tracheoscopy, and bronchoscopy. Total CE hours = 9.

August 24-25, 2000 • Joint Instability Operative Techniques

Instructors: Dr. Randall Fitch, Dr. Elizabeth Pluhar, Dr. Donal Hulse, Dr. Brian Beale

Cost: \$500 non-CVMA member; \$450 CVMA members

This course presents an overview of updated techniques for treating joint instability using suture anchors. Lectures and laboratory will provide insight to basic biomechanical principles of ligament and capsule function, repair techniques, and suture anchor technology. Laboratory attendees will learn new surgical methods for treating hip and shoulder dislocations, cranial curiae ligament ruptures, and collateral ligament injuries of the upper and lower extremity. Six hours of lecture and plastic bone laboratory will be performed the first day followed the next day by a four-hour practical laboratory. Total CE hours = 10.

August 24-27, 2000 • Offering Behavior Services in Small Animal Practice

Instructor: Dr. Rolan Tripp

Cost: \$200 non-CVMA member; \$180 CVMA member

Shelter surrender data suggests that behavior concerns are the leading cause of canine euthanasia in the US. The course instructs in basics of practical behavior modification, and how to begin to offer behavior services in veterinary practice. This includes internal staff protocols to bond the pet and owner to the practice, and reduce injury. Participants will learn about the medical work up to rule out physical components of behavior problems, and practical use of behavior medications.

August 30-September 1, 2000 • Diagnosis and Treatment of Lameness in the Horse

Instructors: Dr. Ted Stashak, Dr. Wayne McIlwraith, Dr. Gayle Trotter, Dr. Richard Park, Dr. Gary Baxter, Dr. Dean Hendrickson

Cost: \$500 non-CVMA member; \$450 CVMA member

The course is designed to cover the various causes of lameness in the horse. It will cover each condition and its diagnosis in detail (including diagnostic nerve blocks and radiographic features).

The treatment (medical and surgical) of each condition will be presented, and the various surgical procedures will be performed by the participants in

C ontinuing Veterinary Medical Education

the lab.

September 2000

September 7-8, 2000 • Equine Dentistry

Instructors: Dr. Pat McCue, Dr. Jack Easley, Dr. Leon Scrutchfield
Cost: \$500 non-CVMA member; \$450 CVMA member (lecture and lab)

This program will consist of a lecture and slide demonstration on anatomy and physiology of the mouth, including examination of the mastication process, procedures for floating teeth, removing wolf teeth, removing retained deciduous premolars, creating bit seats, treating malocclusion and abnormal wear, hook removal, dental extraction, incisor realignment, leveling teeth, cutting teeth, and the use of power tools. In the laboratory, groups of three to four veterinarians will work closely with the faculty in gaining hands-on training to perfect their skills in equine dentistry using cadaver skulls and live horses. The latest dental equipment will be exhibited or demonstrated. In addition, participants are requested to bring their own dental equipment so that the best way to use it can be demonstrated.

September 13-15, 2000 • Small Animal Cardiology

Instructors: Dr. E. Christopher Orton, Dr. Janice Bright, June Boon
Cost: \$450 non-CVMA member; \$405 CVMA member

This course will cover basic and advanced diagnosis and management of cardiac conditions of dogs and cats. Afternoon laboratories will include training in echocardiography, ECG interpretations, and case discussions.

October 2000

October 12-13, 2000 • Small Animal Laparoscopy

Instructor: Dr. David Twedt
Cost: \$565 (if received two months prior), \$590 (if received one month prior), \$615 (if received month of course)
Lecture Only: \$200 (lecture only)
Technicians: \$200 (attend lecture and observe lab)

A nine-hour short course introducing the small animal practitioner to the indications and technique of laparoscopy. The course will include five hours of lecture and "Black Box" training, followed by a four-hour, hands-on laboratory, in which participants will perform laparoscopy on dogs. Participative demonstrations of thoracoscopy also will be presented in the lab. Total CE hours = 9.

October 18-20, 2000 • Current Topics in Feline Medicine

Instructors: Dr. Dave Twedt and various Colorado State University faculty
Cost: \$450 non-CVMA member; \$405 CVMA member

This course will provide discussion in selected areas currently relevant to feline medicine.

The intent will be to provide clinically useful, practical information in the following subject areas: endocrine and metabolic diseases, dermatology, cardiology, urology, oncology, reproduction, neurology, and infectious diseases.

November 2000

November 8-9, 2000 • Flexible GI Endoscopy

Instructor: Dr. David Twedt
Cost: \$525 (if received two months prior), \$550 (if received one month prior), \$575 (if received month of course)
Lecture Only: \$200 (Wednesday)
Technicians: \$200 (attend lecture and observe lab)

A perfect introduction or refresher including indications, instrumentation, and technique. Five hours of lecture are followed the next day by four hours of wet lab, providing hands-on experience in upper GI endoscopic exam, PEG tube placement, and foreign body retrieval. Total CE hours = 9.

November 10-11, 2000 • Canine Arthroscopy

Instructors: Dr. Timothy McCarthy, Dr. Jean Francois
Cost: \$750 (if received two months prior), \$775 (if received one month prior), \$800 (if received month of course)

This seminar presents a thorough and practical overview of canine arthroscopy of the shoulder, elbow, and stifle. Indications, instrumentation, and technique will be team-taught by two world-renowned small animal surgeons who perform canine arthroscopy on a routine basis in their practices. Six hours of lecture will be followed the next day by a five-hour practical lab. Total CE hours = 11.

December

December 6-7, 2000 • Management of the Acute Abdomen in the Horse

Instructors: Dr. Ted Stashak, Dr. Josie Traub-Dargatz, Dr. Gary Baxter, Dr. Dean Hendrickson, Dr. Ann Wagner
Cost: \$600 non-CVMA member; \$540 CVMA member

The clinical evaluation of the acute abdominal patient leading to a decision whether medical treatment or surgical intervention is required will be reviewed. Medical and surgical therapy will be discussed with specific emphasis on selection of drugs, preoperative patient preparation, anesthesia, intraoperative findings, postoperative care, and complications. Indications for the use of surgical stapling will be reviewed and the techniques illustrated.

The laboratory will include application of techniques that are used in the clinical evaluation and treatment of an acute abdominal patient. This will be followed by a thorough review of surgical anatomy on a cadaver. The decision for surgical intervention, selecting anesthetic regimens, selection of laparotomy approach, and correction of the intraabdominal lesions are included. Each participant will have the opportunity to thoroughly explore the abdominal cavity and perform an enterotomy for emptying the large colons, an intestinal resection anastomosis, and other procedures they wish to perform. A demonstration of the use of surgical stapling equipment for resection and anastomosis of the large and small colon will be included.

All courses have enrollment limitations. If the minimum enrollment is not reached three weeks prior to the scheduled date, the course will be canceled. For information on additional equine course offerings, please call (970) 491-8509.

VTH Holds Year 2000 Open House

Colorado State University's Veterinary Teaching Hospital held its annual open house April 7, 8, and 9, inviting the public to drop in and take a look at veterinary medicine behind the scenes.

The event featured something for everyone, including educational exhibits for children and informational programs for adults. The open house this year included mock surgeries, a petting zoo, displays, and presentations on a wide variety of animal-related topics. In addition, numerous organizations had booths set up to provide interested individuals with information about volunteer opportunities, community programs, veterinary education, and more. Visitors also had the rare opportunity to visit and tour the Rocky Mountain Raptor Program and learn about the program's raptor rescue efforts.

If you missed this year's open house, make plans to visit the Veterinary Teaching Hospital during next year's event. To schedule group tours or inquire about seminar topics and times, call (970) 491-7053. ■



Young Open House visitors are fascinated by the opportunity to participate in "mock surgeries."

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